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An Examination of Variance in Risk Factors Associated with Diagnosis of Coronary Heart Disease

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AN EXAMINATION OF VARIANCE IN RISK FACTORS ASSOCIATED WITH DIAGNOSIS OF CORONARY HEART DISEASE

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I. ABSTRACT

Risk factors associated with coronary heart disease (CHD) are well-established in the literature. Still, there is a need for continuing investigation into variance in the clustering and effect of these risks across racial/ethnic and gender categories. This study examined differences in the odds of diagnosed CHD in the United States, among black and white men aged 45 and over, and women aged 55 and over. Annually in the U.S., more than 30 percent of all black deaths result from cardiovascular disease. Yet the rate of this illness and related death varies across racial groups. Nonetheless, given the persisting disparity in CHD-related morbidity and mortality, research has not adequately addressed whether there are different constellations of CHD risk factors that are more or less evident in different demographic groups. Using data from the 2002 National Health Interview Survey, with a national probability sample of adults, descriptive statistics support previous reports of a disproportionate percentage of U.S. blacks with multiple risk factors for CHD. However, logistic regression models reveal different combinations of independent risk factors associated with CHD diagnosis for blacks and whites, and also specific gender distinctions associated with the odds of having a diagnosis of CHD. Eliminating disparities among diverse population groups requires aggressive efforts focused on specific demographic group risk assessment, guideline adherence, and risk factor control.

KEY WORDS: Health disparities, coronary heart disease, ethnicity and health, African American health status.

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II. INTRODUCTION

Although in the United States death rates due to CHD have declined, the disparity between African Americans and whites has increased. For example, data indicate that CHD death rates declined by 33.3 percent in African-American men between 1979 and 1998, compared to 46.1 percent in white men. At the same time, CHD death rates decreased by 26.6 percent in African American women compared to 40.1 percent in white women (American Heart Association 2002; World Health Organization n.d.). Even with this decline in mortality related to CHD, recent data show that each year, nearly 37 percent of all African American deaths are due to CHD (American Heart Association 2005). The risk factors for CHD have been well-documented in the literature, and include lifestyle and medical conditions, such as dyslipidemia (disorders of lipoprotein metabolism related to high serum cholesterol) (Alderman et al. 1994; Kannel 1996; Lamarche 2002), major depression (Katon et al. 2004), cigarette smoking (Ebbert et al. 2004; Henley et al. 2004), high blood pressure (Grundy et al. 1999), alcohol abuse (Ebbert et al. 2004), physical inactivity (Snell & Mitchell 1999), diabetes mellitus (Summerson et al. 1996), and obesity (Jousilahti et al. 1996; Nelson, et al. 2002). Metabolic syndrome, a related condition, also confers a high risk for CHD, as well as for the development of type 2 diabetes (Haffner 2002; Kahn & Valdez 2003). Diabetes and metabolic syndrome are characterized by the presence of central obesity and insulin resistance, which result in dyslipidemia, hypertension, and cardiovascular derangements that promote CHD.

In spite of having a higher CHD risk, black men and women in the U.S. are less likely to receive adequate treatment or control risk factors. Eliminating disparities among population groups will thus require aggressive efforts focused on specific demographic group risk assessment, guideline adherence, and risk factor control among populations in need.

This study investigated variance in the likelihood of physician diagnosed CHD among black and white adults in the U.S. To achieve this aim, the investigator focused on men aged 45 and over, and women aged 55 and over. Emphasis was placed on these two age cohorts, since previous empirical evidence has suggested that, in general, the incidence of CHD is low in men and women under age 35 years. Although men are more likely to develop the symptoms of CHD after they have passed the age of 45, women have a ten-year "reprieve," and seem to be protected

from CHD by the effects of estrogen until post menopause, which normally occurs in the mid-50s (Snell & Mitchell 1999; Zagaria n.d).

III. BACKGROUND

Recent studies of black and white women with CHD indicate that the risk for cardiovascular mortality was higher among black women than white women, and the reasons for this disparity are largely unexplored (Jha et al. 2003). Despite the differences in mortality due to heart disease, in their study, Jha indicated that black women less often received appropriate preventive therapy and adequate risk factor control despite a greater CHD event risk. Other researchers also have investigated racial/ethnic differences in cardiovascular disease (CVD) mortality (Jones-Webb et al. 2004). In their study, Jones-Webb reported that older black men who lived in more impoverished neighborhoods had significantly and disproportionately higher CVD mortality rates than did older white men living in more impoverished neighborhoods. However, this was not the case among older black and white men living in less impoverished neighborhoods. The study concluded that socioeconomic status as measured by neighborhood poverty moderates the effects of race on CVD mortality in older black and white men. Further, the researchers postulated that this effect may not have been as apparent without the inclusion of socioeconomic position as a major variable of interest, and the measurement of it at multiple levels.

A within-group study of hypertension among black women and men ranging in age from 20-80 (Collins & Winkleby 2002) identified distinct subgroups with highly variable rates of hypertension (11-78 percent). The two groups with the highest rates of hypertension were more likely to be middle-aged or older, less educated, overweight or obese, physically inactive, and have diabetes. The two groups with the lowest hypertension rates were more likely to be younger, but were also overweight or obese. Among hypertensives, those who were uncontrolled and not on antihypertensive medications were male, younger age, and had infrequent contact with a physician. These investigators have pointed to the importance of recognizing that hypertension rates vary substantially within African Americans, and they also highlight the need for effective weight management, diabetes control, and increased access to health care for those at highest risk.

In an examination of the relationship between alcohol consumption and risk for CHD (Fuchs et al. 2001), it was reported that blood pressure was higher in black men who consumed low to moderate amounts of

alcohol compared with non-consumers. Overall, the consumption of alcohol in amounts greater than or equal to 210 grams per week (roughly 7.5 ounces) was an independent risk factor. Still, the consumption of low to moderate amounts of alcohol also appears to be associated with a higher risk of hypertension in black men. Although a highly correlated relationship is documented in the literature, it remains unclear whether there is some consumption threshold.

Research examining the link between major depression and cardiac risk among patients with diabetes mellitus found that patients with major depression and diabetes were between 1.5 and two times more likely to have three or more cardiovascular risk factors, compared with patients with diabetes, but without depression (Katon et al. 2004). The investigators recommended that interventions aimed at decreasing these risk factors may need to address treatment for major depression in order to be effective. Another study (Berkman et al. 2003) investigating the effects of depression and low perceived social support (LPSS) after myocardial infarction indicates that depression and low perceived social support was associated with higher morbidity and mortality. However, there is a dearth of empirical literature addressing whether this excess risk is reduced through treatment. The objective of the Berkman study was to determine whether mortality and recurrent infarction was reduced by treatment of depression and low perceived social support with cognitive behavior therapy. The findings showed that intervention improved depression and social isolation, although the relative improvement in the psychosocial intervention group compared with the usual care group was less than expected due to substantial improvement in usual care patients.

Examinations of the relationship between family history measures, and the risk for CHD considered family size (American Heart Association 2004), and the incidence of myocardial infarction (MI). A study by Vitullo (1996) illustrated that large family size seemed to be protective for MI. On the other hand, a 1999 study by Silberberg and reported that some risk factors for CHD increased with family size.

Given the identified risks factors for CHD and suggested protective influences, as outlined above, the present investigation was interested in three specific research questions, as indicated below:

1. What is the distribution of physician diagnosed CHD among black and white U.S. males aged 45 and over, and females aged 55 and over?
2. Are there significant racial/ethnic, or gender differences in the risk factors associated with diagnosed CHD?

3. What factors account for the racial/ethnic and gender variance in the odds of having a diagnosis of CHD?

IV. METHOD

Data are from the 2002 National Health Interview Survey[2] (National Center for Health Statistics 2003) with a probability sample of 31,044 adults aged 18 and over. All analyses used weight factor to construct U.S. population estimates from this probability sample. Descriptive statistics and logistic regression models were used to analyze males age 45 and over, and females age 55 and over. Therefore, the population estimates of this analytic sample are white males (N = 25,505,035), black males (N = 2,684,180), white females (N = 16,413,968), and black females (N = 1,807,513). The dependent variable was a binary measure of whether a physician had diagnosed the individual as having CHD (0 = no, 1 = yes). Independent and control variables included a continuous measure of chronological age (black men M = 57.9, SD = 10.47), (white men M = 60.1, SD = 11.28), (black women M = 66.9, SD = 9.0), (white women M = 68.5, SD = 9.4), education level by category (on average, slightly more than high school education), marital status (0 = never married, 1 = previously married, 2 = married), a binary measure of ratio of income to poverty level (at or below poverty level = 0; above poverty level = 1), and several physician diagnosed or self-reported CHD risk factors including, high cholesterol (0 = no, 1 = yes), hypertension (0 = no, 1 = yes), diabetes (0 = no, 1 = yes), obesity (BMI 30+ = yes), overweight (BMI 25.0-29.9 = yes), smoking status (0 = never smoked, 1 = former smoker, 2 = current smoker), alcohol use (0 = lifetime abstainer; 1 = former drinker, no drinks in past 12 months, 2 = current drinker).

Additionally, this study controlled for whether the respondent had a usual place for health care (0 = no, 1 = yes), use of health facility at least ten times per year (0 = no, 1 = yes), functional limitations (e.g., difficulties bathing, walking a distance, toileting, etc.), self-reported depressive symptoms (sad, nervous, restless, hopeless, effort, worthless). For each of the depressive symptoms the respondents were asked how frequently they experienced the symptoms during the past 30 days (0 = none of the time, 1 = little of the time, 2 = some of the time, 3 = most of

[2] Disclaimer – all analyses, interpretations, or conclusions reached in this study are credited exclusively to the author (recipient of the data file) and not to NCHS, which is responsible only for the initial data.

the time, 4 = all the time). The index of the six depressive symptoms yielded an alpha coefficient of 0.877. The range of the depression index was from 0-24 with higher scores indicating more frequency of collective symptoms of depression. In this sample, the mean depressive score for black men was 1.82 (SD = 3.44), compared to their white counterparts (M = 1.88, SD = 3.53). Alternatively, among the females in this study, the level of depression for black women was on average 2.27 (SD = 3.70), compared to white women (M = 2.31, SD = 3.79). In general then, both male groups reported depression a "little of the time." On the other hand, as would be expected, both groups of women reported greater frequency of depressive symptoms, which on average was typically "some or most of the time."

V. RESULTS

A. Descriptive Analyses

The data show that 6.1 percent of black men age 45 and older reported a physician's diagnosis of CHD, compared with 11.6 percent of white men the same age. Among the women in this study, 7.9 percent of black women aged 55 and over, compared with 8.5 percent of white women in the same age cohort reported physician diagnosed CHD. In terms of high cholesterol levels, the distribution of this risk factor was about 28 percent of black men, contrasted with 36.5 percent of white men. Conversely, a similar proportion of black women (39.8 percent) and white women (39.5 percent) reported high cholesterol levels. As expected, there was a statistically significant ($P < .001$) greater proportion of black men with doctor diagnosed hypertension (48 percent), compared to 39 percent of white men in the same age cohort. As with the prevalence of hypertension among the black men in this study, there also was a statistically significant ($P < .001$) greater proportion of black women (65 percent), compared to white women (48 percent) who reported physician diagnosed hypertension. Nearly 6 percent (5.9 percent) of black men reported diagnosis of stroke, versus 4.7 percent of white men. Among the women in this study, there was a comparable proportion with diagnosis of stroke. For example, 6.5 percent of black women, and 6.1 percent of white women reported having a diagnoses of stroke. In considering the distribution of diabetes, black men (16.2 percent) were significantly more likely ($P = 0.03$) to report a diagnosis of diabetes than white men (13.3 percent). Not surprisingly, black women (24.3 percent) also were significantly more likely ($P < .001$) to have a diagnosis of diabetes than their white counterparts (12.7 percent).

A major concern regarding risk for CHD is being overweight and /or obese. Although obesity has of late been receiving more media attention, the proportion of individuals in the U.S. who are overweight and/or obese is staggering. This is particularly alarming among the African American population. To illustrate, the data show that 48.5 percent of black women aged 55 and over are obese ($M_{BMI} = 34.12$, SD = 17.84), versus 27.6 percent of white women ($M_{BMI} = 29.43$; SD = 12.23) in the same age cohort. If you also consider the proportion of black women in this age cohort that are overweight (34.9 percent), the combined percentage of these women who are either obese or overweight is more than 80 percent. Unfortunately, the picture among black men aged 45 and

over is equally disturbing. Specifically, 50.0 percent of black men age 45 and over, in this study, versus 53.2 percent of white men in the same age group, are overweight. Further, 31.4 percent of black men aged 45 and over are obese (M_{BMI} = 29.64, SD = 12.61), compared with 27.7 percent of white men in the same age group (M_{BMI} = 29.43, SD = 12.23). As with the black women in this study, more than 80 percent of black men aged 45 and over are either overweight or obese.

B. Multivariate Logistic Regression Analysis

Tables 1-4 illustrate the odds ratios associated with each independent risk factor regressed on physician diagnosed CHD. *Statistically significant odds ratios are indicated in bold print.* For each logistic regression model, the complete set of independent and control variables were entered at the same time. A goal of this study was to identify sources of variance in risk factors related to the chance of having a diagnosis of CHD. As shown in Tables 1-4, there were different sets of risk factors linked with the odds of having physician diagnosed CHD. For example, in Table 1, the data show that for black males the odds of having CHD are increased with advancing age (5 percent increase in risk with each year), having diabetes (more than three times increased risk, compared with those not having diabetes), and hypertension (nearly four times increased risk, compared with those not having hypertension).

By comparison, in Table 2, the logistic regression model points to a larger and somewhat different set of risk factors for white males. In this case, advancing age had a comparable risk effect as that for black men. However, also shown is that for white men, several significant factors emerged that were not significant for black men. These included being married (increased the chance of diagnosis for CHD by 39 percent, compared to unmarried white men), smoking habits (smokers had 12 percent greater odds than non-smokers or former smokers), high cholesterol (more than 4.5 times the chance of CHD diagnosis than those white men without high cholesterol), diabetes (more than 2 times the chance of CHD diagnosis, compared with white men not having diabetes), hypertension (about 38 percent greater odds of CHD diagnosis), health facility use (nearly 65 percent increased chance of CHD diagnosis), and functional limitations (about 70 percent increase in the odds of having CHD diagnosis, compared with less physically active counterparts).

In Table 3 and Table 4, the data for women also illustrate specific race and gender distinctions in the cluster of CHD risk factors. For example, Table 3 shows that unlike black men, for black women, having

high cholesterol was a significant risk factor that more than doubled their odds a CHD diagnosis. Additionally, for black women, having diabetes more than doubled the chances of CHD. Further, black women who used health facilities had more than four times the likelihood of a physician diagnosis of CHD. An important result is the relationship between frequency of depressive symptoms and CHD. Among the black women in this study, those with frequent depressive symptoms had 14 percent greater chance of having CHD.

Looking at the results for white women, the data reveal that similar to white men, there is a larger constellation of risk factors when compared to their black female counterparts. Specifically, among white women, advancing age (5 percent more likely with each year), family size (22 percent increase in chance for CHD diagnosis with each additional family member), smoking status (18 percent more likely CHD diagnosis than non-smokers), high cholesterol (nearly a three times greater risk when a white woman has high cholesterol), and diabetes (nearly 63 percent increased likelihood of CHD diagnosis) were each identified as risk factors. Moreover, for white women, hypertension was found to be significantly to CHD diagnosis with more than two times increased odds of CHD diagnosis. Unlike black women, white women having functional limitations was a significant factor that tripled the risk of having diagnosis of CHD. Further, the chances of having diagnosed CHD increased by 3 percent as the frequency of depressive symptoms also increased.

TABLE 1- Odds of Diagnosis of CHD Among U.S. Black Males Age 45 and Over Pseudo R2 = .22

Coronary Heart Disease	Odds Ratio	Std. Err.	T	P > t	[95% Conf.	Interval]
Age	1.054174	.02297	2.42	0.015	1.010099	1.100172
Education	1.081674	.0868001	0.98	0.328	.9242454	1.265918
Marital Status	2.241965	1.239739	1.46	0.144	.7584289	6.627393
Family Size	.8080154	.2180839	-0.79	0.430	.4760664	1.371424
Above Poverty Level	1.370395	.8113716	0.53	0.595	.4293846	4.373658
Obese	.4145551	.266872	-1.37	0.171	.1173782	1.464121
Overweight	.5626993	.2719064	-1.19	0.234	.2182421	1.450822
Smoking Status	1.375434	.3284026	1.34	0.182	.8613779	2.196272
Alcohol Use	1.113089	.4636689	0.26	0.797	.4919647	2.518406
High Cholesterol	1.449252	.8033259	0.67	0.503	.4889839	4.2953
Diabetes	3.095784	1.728486	2.02	0.043	1.036309	9.248092
Hypertension	3.784661	2.285051	2.20	0.028	1.158971	12.35895
Health Facility Use	.1621119	.2135145	-1.38	0.167	.0122646	2.142775
Functional Limitations	1.941875	.9596775	1.34	0.179	.7371122	5.115745
Depressive Symptoms	1.065155	.0578401	1.16	0.245	.9576095	1.184779

Data Source: National Center for Health Statistics (2002)

TABLE 2 - Odds of Diagnosis of CHD Among U.S. White Males Age 45 and Over Pseudo R2 = .21

Coronary Heart Disease	Odds Ratio	Std. Err.	t	P > t	[95% Conf.	Interval]
Age	1.064454	.0072604	9.16	0.000	1.050318	1.078781
Education	.9859201	.0226796	-0.62	0.538	.9424537	1.031391
Marital Status	1.395115	.187324	2.48	0.013	1.07229	1.815132
Family Size	.8936383	.0782667	-1.28	0.199	.7526756	1.061001
Above Poverty Level	1.279346	.3362799	0.94	0.349	.7642494	2.141612
Obese	1.17107	.2418162	0.76	0.444	.7812809	1.755328
Overweight	1.172113	.2154793	0.86	0.388	.817481	1.680588
Smoking Status	1.123936	.0761856	1.72	0.085	.9841024	1.28364
Alcohol Use	.9122118	.0902788	-0.93	0.353	.7513641	1.107493
High Cholesterol	4.783097	.6522078	11.48	0.000	3.661304	6.248597
Diabetes	2.225001	.3669569	4.85	0.000	1.610419	3.074126
Hypertension	1.377987	.1904138	2.32	0.020	1.051036	1.806644
Usual Place for Health Care	1.288127	.5357615	0.61	0.543	.5700406	2.910797
Health Facility Use	1.644238	.3190008	2.56	0.010	1.124122	2.405007
Functional Limitations	1.692109	.2480335	3.59	0.000	1.269552	2.25531
Depressive Symptoms	1.014457	.0162503	0.90	0.370	.9831004	1.046814

Data Source: National Center for Health Statistics (2002)

TABLE 3 - Odds of Diagnosis of CHD Among U.S. Black Women Age 55 and Over Pseudo R2 = .21

Coronary Heart Disease	Odds Ratio	Std. Err.	t	P>t	[95% Conf.	Interval]
Age	1.085212	.0293752	3.02	0.003	1.029136	1.144344
Education	1.003811	.0575593	0.07	0.947	.8970995	1.123215
Marital Status	.9054414	.4228889	-0.21	0.832	.3624791	2.261714
Family Size	1.091168	.153745	0.62	0.536	.8278493	1.438242
Above Poverty	.9628639	.3941794	-0.09	0.926	.431598	2.148079
Obese	1.140897	.7359875	0.20	0.838	.3221891	4.040006
Overweight	.485257	.3084267	-1.14	0.255	.1396124	1.68663
Smoking Status	1.356419	.2882787	1.43	0.151	.8942911	2.057353
Alcohol Use	.9821307	.2474966	-0.07	0.943	.5993152	1.609472
High Cholesterol	2.62467	1.09178	2.32	0.020	1.161402	5.931529
Diabetes	2.762534	1.207931	2.32	0.020	1.172454	6.509077
Hypertension	2.053024	1.501247	0.98	0.325	.4897005	8.607112
Health Facility Use	4.33455	3.810987	1.67	0.095	.7736019	24.28681
Functional Limitations	2.590007	1.689342	1.46	0.145	.7212268	9.301009
Depressive Symptoms	1.143626	.0581861	2.64	0.008	1.035079	1.263555

Data Source: National Center for Health Statistics (2002)

TABLE 4 - Odds of Diagnosis of CHD Among U.S. White Women Age 55 and Over Pseudo R2 = .16

Coronary Heart Disease	Odds Ratio	Std. Err.	t	P>t	[95% Conf.	Interval]
Age	1.05117	.0099762	5.26	0.000	1.031797	1.070907
Education	.9858194	.0291193	-0.48	0.629	.9303644	1.04458
Marital Status	.9508896	.1559158	-0.31	0.759	.689529	1.311317
Family Size	1.221799	.1434764	1.71	0.088	.9705939	1.53802
Above Poverty Level	1.365977	.278999	1.53	0.127	.9153291	2.038494
Obese	.8606599	.1772894	-0.73	0.466	.5747529	1.28879
Overweight	.8641194	.1647908	-0.77	0.444	.5946177	1.255769
Smoking Status	1.184329	.0860955	2.33	0.020	1.027047	1.365697
Alcohol Status	.9208223	.0921888	-0.82	0.410	.7567503	1.120467
High Cholesterol	2.650971	.4282438	6.04	0.000	1.93149	3.638457
Diabetes	1.629893	.3036858	2.62	0.009	1.131235	2.348365
Hypertension	2.140032	.3758031	4.33	0.000	1.516826	3.019288
Usual Place for Health Care	1.935695	1.091369	1.17	0.241	.6410516	5.84495
Health Facility Use	.967081	.2780988	-0.12	0.907	.5503942	1.699229
Functional Limitations	3.141075	.7247156	4.96	0.000	1.998374	4.93719
Depressive Symptoms	1.03261	.0160827	2.06	0.039	1.001563	1.064619

Data Source: National Center for Health Statistics (2002)

VI. DISCUSSION

This study was interested in identifying differences in the distribution of physician diagnosed CHD, and associated risk factors among black and white U.S. males aged 45 and over, and females who were over 55 years of age. A particular emphasis of this study was racial/ethnic and gender variance in the chance of having a diagnosis of CHD. The findings provide preliminary support for placing the probability of physician diagnosed CHD into a more specific context of race/ethnicity and gender. As reported earlier in this paper, the data suggested distinct sets of significant risk factors with varying effects on the likelihood of CHD diagnosis for black men and women, compared with white men and women. Of course, in the broader context of risk factors associated with CHD, this study is not attempting to minimize or negate the empirically established links to CHD. Rather, the findings of this study magnify the importance of specialized public health education and intervention strategies for specific risk control. Nonetheless, it is important to use caution when interpreting the findings of the present study for several circumstances.

First, the outcome of interest here was physician diagnosed CHD, or the prevalence of doctor-diagnosed CHD. This outcome is different from "prevalence" of CHD in the epidemiological sense (e.g., the ratio for a given time period, of the number of occurrences of a disease or event to the number of units at risk in the population). The findings indicated that in general, white males were more likely than black males to have had a diagnosis of CHD. From these data, it should *not* be concluded that the prevalence of CHD is lower among black men. Rather, the smaller proportion of black men reporting a physician's diagnosis of CHD may be due to less frequent physician visits, less access to health care, or physician bias. To illustrate, about 20 percent of black Americans lack a usual source of health care, and 16 percent of African Americans rely on clinics and hospitals for their usual health care (Blendon et al. 1989; Weissman et al. 1991; AHRQ 2000; Adamson et al. 2003). Indeed, prior studies have suggested that blacks may be more likely than whites to delay seeking care for CHD symptoms (Frayne et al. 2002). A related explanation may come from the observation that blacks less often receive appropriate preventive therapy and adequate risk factor control (Jha et al. 2003).

A second point of caution about the findings of this study is in the interpretation of the non-significance of risk factors such as obesity, being

overweight, smoking patterns, or alcohol use among blacks. Although the independent effects of these particular risk factors were not statistically significant for black men and women, in a separate analysis not reported here, as would be expected, obesity was significantly correlated with high cholesterol, hypertension, and diabetes. Obviously, these findings of non-significance do not suggest that black women and men are to be less concerned about their BMI, and other health or lifestyle statuses.

Although there were few, if any surprises revealed by these data analyses, the findings do draw attention to important racial/ethnic and gender differences in the prospect of having a physician's diagnosis of CHD. For example, the finding that white men with diabetes had less likelihood of CHD diagnosis than black men with diabetes may indicate better illness control and treatment of diabetes for white men (Jha et al. 2003). Another explanation, although contrary to the "better/less adequate care hypotheses" is that these results are consistent with the concept that racial differences in risk are a result of differential genetic susceptibility to the adverse effects of increased levels of blood glucose and/or blood pressure (e.g., Harris et al. 1999). Interestingly, the within-black group analysis showed that black men with diabetes were more likely to have had CHD diagnosis than black women with diabetes. This difference may reflect a need for specific educational interventions aimed at black women (Schoenberg et al. 1998). An unexpected finding was the greater likelihood of CHD diagnosis among black women with diabetes, compared with white women having diabetes. It is plausible that African American women tend to rely more heavily than whites on their informal social networks to meet their disease management needs and that social support is significantly associated with improved diabetes management among members of this population (Ford et al. 1998).

The impact of hypertension on CHD diagnosis among black men compared to white men with hypertension may in part be explained by the "John Henryism Hypothesis" (James et al. 1983; James 1994), which suggests that the well-known increased risk for hypertension in poor and working class African Americans could be due to their heightened exposure to social and economic adversity on the one hand and, on the other, to their strong behavioral predisposition to confront such adversity with determined, high-effort coping. A more physiological explanation may come from a recent study reporting that African Americans with high blood pressure have nearly double the risk for an enlarged heart (left ventricular hypertrophy) compared to their white counterparts with high blood pressure (Kizer et al. 2004). This increase in muscle mass in the heart's pumping chamber is due to an increased workload on the heart, and

is a strong predictor of heart disease, stroke, and death. Although cautious in offering an explanation for these racial differences, the investigators did speculate that because of unequal access to health care, the African Americans may have had the high blood pressure for longer periods than the whites (Kizer et al. 2004).

The significant relationship between frequency of depressive symptoms and CHD is well-established in the literature (e.g., Atho et al. 1997; Carney et al. 1999; Mills 2001). For example, research to determine the relationship between depressive symptoms and cardiovascular events found that the average level of psychological distress was significantly higher in coronary patients than in controls on all tests (Pignalberi et al. 1998). On an international perspective, Strodl (2003) found perceived stress to be a significant independent correlate of new diagnosis of symptomatic CHD in an older adult sample of Australian women. Additionally, the literature has consistently documented the greater frequency and higher levels of depressive symptoms among women, compared to men (e.g., Perlin 1989; Blazer et al. 1991; Mirowski 1996). However, the findings are ambiguous concerning differences in levels of depression among black and white women. Often, African American women are identified as being at high risk for depression. Yet, they also are perceived as either delaying or not seeking treatment for depression (Mills 2000). One explanation for the greater impact of black women's depression is a suggestion that African American women may see themselves as devalued within American society and may have fewer support systems to buffer stressful conditions (Warren 1994). Nonetheless, Mui & Burnette (1996) found that older African American women reported fewer depressive symptoms than their white counterparts. Yet their study suggests that physical illness, perceptions of unmet need, and a low sense of control were common predictors of depression. However, since heart problems involve treatment and medication and may result in limiting social interaction by possibly restricting mobility, a result is increased frequency of depressive symptoms. Cardiac patients often report higher levels of social isolation, avoidance, and self-blame and more painful life events than controls (see Pignalberi et al. 1998; Steffens et al. 1999). Potentially, the social expectations placed on women's roles, social isolation, and restricted mobility may account for the significant relationship between depression and CHD for women.

VII. CONCLUSION

Explanations for the variance in the prospect of a physician diagnosis of CHD are complex and include social, behavioral, environmental, genetic, and physiological reasons. Researchers have found evidence in support of a genetic predisposition contributing to some aspects of cardiovascular health, which helps to explain a significant amount of the racial/ethnic and gender variance in risk factors (American Psychological Association, 1997). Yet, it is the manner in which predispositions interact with the environment that determines the extent to which they may become manifest, recognized, and treated. Social, behavioral, and psychological factors such as the thoughts and actions of patients, support networks, and healthcare practitioners are important in activating the gene-environment interaction, and warrant careful consideration. The findings of this preliminary study also point toward a continuing need to develop and improve prevention programs tailored to the education, ethnicity, and other characteristics of populations at increased risk for CHD. As an example, among many women, misperceptions still exist that cardiovascular disease is not a real problem for women, particularly CHD and stroke, which continue to be the leading causes of death of women in the U.S. and most developed countries. Continued educational interventions for physicians and other healthcare providers also are necessary to assist these professionals to better integrate cultural competence and sensitivity into their practices, which will improve the quality of preventive care, and lower morbidity and mortality attributed to cardiovascular disease in general, but particularly CHD for black men and women.

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